Space Weather Forecast

Issued on Sunday, 24 October 2021 at 01:16 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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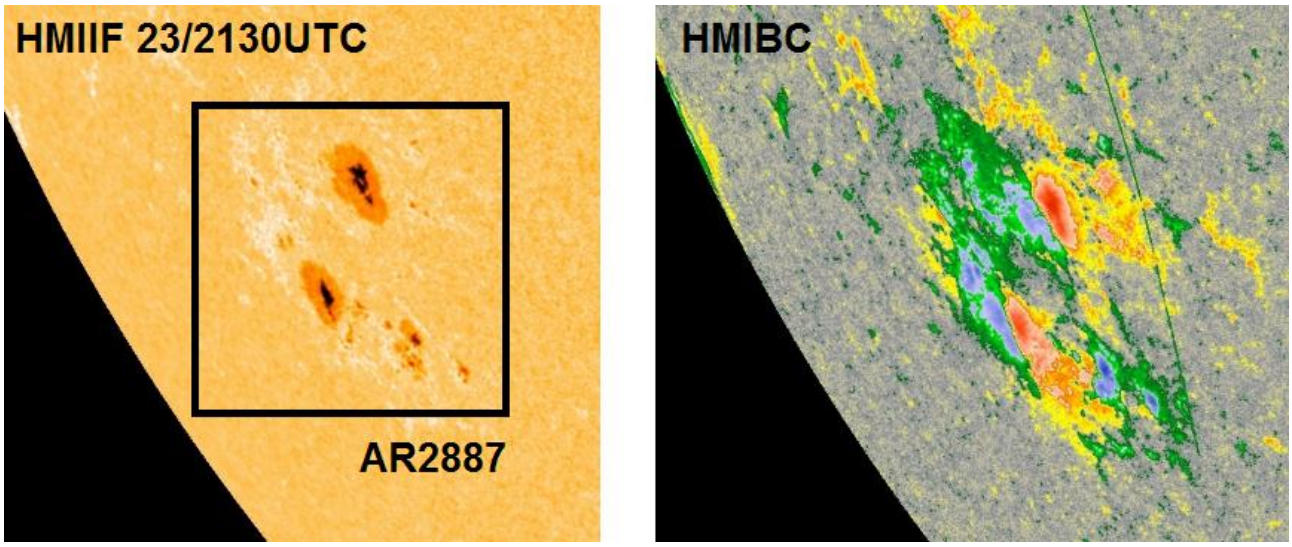
Space Weather Forecast Headline: Daily slight chance of Moderate-class X-ray flares.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity was very low through the UTC day of Saturday 23 October, with X-ray activity comfortably below even common-class. There were two sunspots on the facing side of the sun in the period: the first, a simple unipolar group near the solar meridian, with this spot stable and inactive. The second was larger and more complex, with minor proliferation evident in its southern spots, leading to overall areal growth. This latter group was responsible for much of the (very minor) X-ray flare activity in the period, although there appears to be a bright flux region making some contribution, poised on the southeastern solar horizon. Up to two very minor groups in the northeast faded in the period.

While there are numerous small 'filaments' (arcs of plasma that can lift off to become CMEs) on the sun at present, these appear stable at the time of writing. All observed Coronal Mass Ejections (CMEs) in available satellite imagery were peripheral - mostly from behind the eastern horizon of the sun - with none thought to have an Earth-directed component.

Figure 1: Current visible (left) and magnetic (right) imagery of the largest sunspot on the facing side of the sun, here labelled 'Active Region 2887'.



Solar Wind / Geomagnetic Activity: The solar wind showed a descent into a slow regime in the period, with the solar wind speed falling from a slightly elevated 475km/s peak, to decline in earnest later in the UTC morning. The number of particles in the solar wind followed a flat trend within long-term background, while the magnetic field associated with these particles was

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unremarkable and stable throughout.

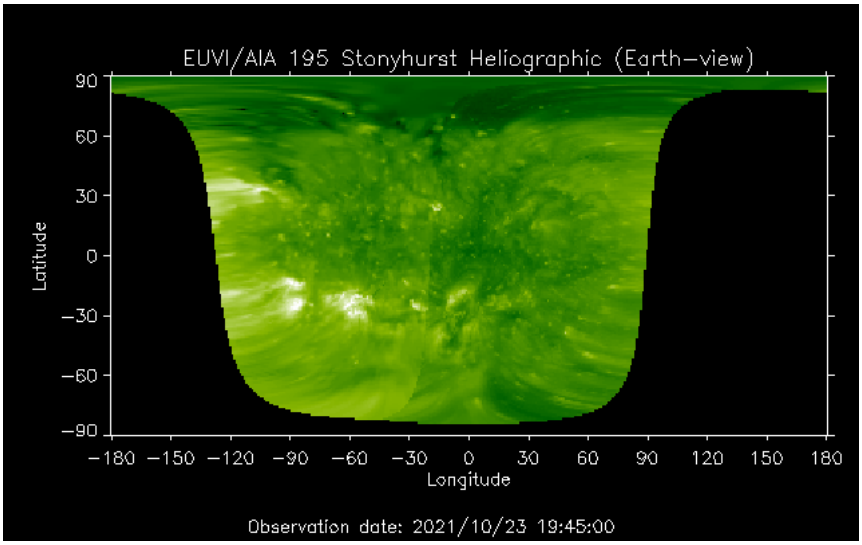
The net result of the preceding solar wind measures was provisionally quiet geomagnetic activity throughout, well below Minor Storm G1, and in fact near the very bottom of the measurement scale.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: There is a daily slight chance of Moderate-class X-ray flares, largely the result of the complexity of the larger of the current sunspots, although this has yet to be borne out in observed X-ray activity. There are possible returning sunspot regions now lying on the southeastern horizon of the sun, and perhaps just over the northeastern edge that may yet increase probabilities into the new working week (UTC), however these do not yet feature in the percentages.

Figure 2: Whole sun cylindrical projection in false-colour extreme UV light. This shows a southeastern solar horizon bright flux region (-90 longitude) and a possible northern hemisphere rear-sided region (-100 longitude) that perhaps corresponds to a returning sunspot region. This second region is visible to a satellite that trails Earth in its orbit by three days.



Solar Wind / Geomagnetic Activity: No CMEs feature in this forecast period, and no 'coronal hole' high speed streams are expected to arrive. A quiet geomagnetic forecast is expected to be the result.

Energetic Particles / Solar Radiation: No solar radiation storms are currently expected.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	10	10	10	10
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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